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09/516,482	03/01/00	DESIMONE	J 5051-460IP

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EXAMINER

BAGWELL, M

ART UNIT	PAPER NUMBER
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1711

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DATE MAILED:

05/29/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/516,482

Applicant(s)

DESIMONE ET AL.

Examiner

Melanie D. Bagwell

Art Unit

1711

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-64 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-64 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claims ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 18) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other:

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:
2. The disclosure describes Figures 5A and 5B in the "Brief Description of the Drawings." However, Figures 5A and 5B do not seem to be present in the application. Furthermore, the description of Figure 1 on pp. 17-18 indicates parts 70, 80, 90, 100, and arrows x and y. However, labels for the indicated parts and arrows are not present on Figure 1.

Appropriate correction is required.

Claim Objections

3. Claims 24 and 47 are objected to because of the following informalities:
4. Claims 24 and 47 seem to have typographical errors. Claim 24 recites a "first thermoplastic polymer has a **percent higher** crystallinity **that** the second thermoplastic polymer" in lines 5-7. It is the examiner's position to treat the claim as reading "first thermoplastic polymer has a **higher percent** crystallinity **than** the second thermoplastic polymer". Claim 47 recites "a higher percent crystallinity **that** the second thermoplastic" in lines 3-4. It is the examiner's position to treat the claim as reading "a higher percent crystallinity **than** the second thermoplastic". Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

6. Claims 1-2, 4-5, 7-8, 10-14, 47-48, 50-51, 53-54, and 56-58 are rejected under 35 U.S.C. 102(e) as being anticipated by Humphrey, Jr. et al.

7. Claim 1 is drawn to a method of producing a foamed material by contacting a first thermoplastic (polyvinylidene fluoride, PVDF elected) and a second thermoplastic (polymethyl methacrylate, PMMA elected) with a blowing agent and subjecting the blend to conditions to create a thermodynamic instability to foam the mixture. The first thermoplastic has a higher percent crystallinity than the second thermoplastic, and the mixture has a lower percent crystallinity than the first thermoplastic. Claim 47 is drawn to a composition comprising a first thermoplastic (PVDF elected), a second thermoplastic (PMMA elected), and a blowing agent. Again, the first thermoplastic has a higher percent crystallinity than the second thermoplastic, and the mixture has a lower percent crystallinity than the first thermoplastic. Claims 2-4 and 48-50 limit the blowing agent, claims 5-9 and 51-55 limit the morphology of the polymers, claims 10-12 and 56-58 limit the compositions of the thermoplastics, and claims 13-14 include a blowing agent separation step.

8. Humphrey discloses an electrode comprising a porous or foamed polyvinylidene fluoride (col. 4 lines 41-57) stabilized to inhibit crystallization and improve conductivity (col. 7 lines 19-23 and 46-52). Thus, the stabilized PVDF is less crystalline than the initial PVDF. Humphrey teaches the addition of PMMA for increasing adhesion of PVDF to metallic conductors (col. 5 lines 44-49), thus forming a PVDF/PMMA blend. PVDF has been shown as a semicrystalline polymer by the need for amorphous stabilization, and PMMA is a known amorphous polymer. Supercritical carbon dioxide is preferred as a blowing agent (col. 9 lines 21-36) for forming open cell foams, where the blowing agent is incorporated into the polymer and allowed to expand. This expansion results from a thermodynamic instability; because the carbon dioxide is incorporated under supercritical conditions, one skilled in the art would clearly envision the expansion resulting from a change in pressure and temperature of the mixture. Also, because the foams are open cell porous foams, one skilled in the art would clearly envision the carbon dioxide venting from the created pores or cells, thus separating from the mixture.

9. Claims 1-2, 7, 13-17, 20-28, 33, 38-40, 43-48, 53, 59-61, and 63-64 are rejected under 35 U.S.C. 102(b) as being anticipated by Weisman. The examiner has extended the search to encompass non-elected thermoplastics due to the limitations presented in claims 21-22 and 44-45.

10. Weisman discloses a foamed polyurethane modified by the addition of a vinyl thermoplastic material. Because Weisman teaches flexible polyurethane foam products formed capable of being processed by heat treatment (col. 5 lines 23-28), it is deemed

that the reference teaches using thermoplastic polyurethane materials. An example shows a composition comprising a polyol mixture, PVC, a silicone surfactant, water, a blowing catalyst, methylene chloride, fire retardant, and a diisocyanate (table, col. 10).

11. Polyurethanes have crystallizable segments that make the polymers semicrystalline. Since polyurethane and PVC are blended, one thermoplastic inherently has a higher percent crystallinity than the other polymer. One of ordinary skill in the art would clearly envision the polymer blend, losing its structure by the mere mixing of the two polymers, as having a lower percent crystallinity than the thermoplastic with the highest percent crystallinity. Furthermore, a chemical blowing agent is used (water) that would produce carbon dioxide upon heating, therefore creating a thermodynamic instability in the mixture.

12. Weisman also teaches the use of siloxaneoxyalkylene block copolymers for use in the invention (col. 7 lines 28-33). The surfactant, solvent, and fire retardant are mixed with the blowing agent and other reactants. Therefore, the blowing agent comprises a co-solvent, surfactant, and fire retardant.

13. The foam is formed by melting the reactants, mixing the composition to bring the reactants into contact, and extruding the foam (col. 8 lines 19-32). The foams of the invention are open-celled, thus allowing the carbon dioxide formed to vent from the foam products.

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. Claims 6, 9, 15, 23, 52, 55, 59, and 64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Humphrey, Jr. et al.

16. Claims 6, 9, 52, and 55 limit the thermoplastic mixture to be amorphous.

Humphrey teaches the inhibited crystallization of the PVDF polymers but does not mention a mixture of stabilized PVDF and PMMA as an amorphous blend. Humphrey indicates the conductivity as inversely related to the crystallinity of the PVDF (col. 7 lines 46-52). Therefore, it is the examiner's position that it would have been prima facie obvious to form a polymer blend having any amount of crystallinity to produce a foam with the desired conductivity. Since Humphrey indicates a desire to improve conductivity, it would have been prima facie obvious to form an amorphous blend to increase conductivity.

17. Claims 15, 23, 59, and 64 limit the blowing agent to further comprise co-solvents or modifiers. Humphrey teaches the addition of plasticizers and co-solvents in the invention (col. 8 lines 7-17), modifiers conventionally used to aid in processing by reducing viscosity and improving solubility, respectively. However, the reference does not mention the combination of the additives with the blowing agent. Combining the additives with the blowing agent would prevent the need to combine the additives

individually. Thus, it is the examiner's position that it would have been prima facie obvious to add a co-solvent or plasticizer to the blowing agent composition in Humphrey's invention with the expectancy of forming a polymer foam with minimal additions.

18. Claims 24-28, 30-38, and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Humphrey, Jr. et al. in view of Pecsok.

19. Claim 24 is drawn to a method of extrusion processing a thermoplastic blend by introducing two thermoplastics to an extruder barrel, heating the mixture to provide a molten blend, contacting the blend with a blowing agent, and subjecting the blend to conditions to create a thermodynamic instability. Again, the first thermoplastic has a higher percent crystallinity than the second thermoplastic, and the mixture has a lower percent crystallinity than the first thermoplastic. Claim 25 limits the contacting step to occur in a mixing section of the extruder, claims 26-27 limit the method to comprise a blowing agent separation step, claims 28-30 limit the blowing agent, claims 31-34 limit the morphology of the thermoplastics, and claims 35-37 limit the compositions of the thermoplastics. Claims 38 and 46 limit the blowing agent mixture to further comprise a co-solvent or modifier.

20. Humphrey applies as above, lacking express mention of an extrusion process used for forming PVDF foams. Humphrey discloses a method of heating the polymer, incorporating supercritical carbon dioxide, and expanding the article. Pecsok discloses an extrusion method for PVDF polymers, where PVDF and additives are introduced into

a powder blender, melt blended in a twin screw extruder, and extruded onto a wire.

Thus, the mixing of the thermoplastics occurs in a mixing section of an extruder, and the components are melt blended. Because of the conventionality of the melt extrusion method, it is the examiner's position that it would have been prima facie obvious to mix the components of Humphrey's invention in the melt in a mixing section of an extruder with the expectancy of beneficial results.

21. Claims 16-20 and 60-63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Humphrey, Jr. et al. in view of van Cleeff.

22. Claims 16-20 and 60-63 limit the blowing agent to comprise a surfactant, which is further limited by composition. Humphrey applies as above, lacking express mention of the use of a surfactant in the invention. However, van Cleeff discloses mixtures of polyvinylidene fluoride in coating compositions, where surfactants are added to stabilize the dispersion of the polymer in a solvent in which the polymer is insoluble (col. 1 lines 33-42 and col. 2 lines 13-34). The reference chooses fluorosurfactants having both CO₂-philic and CO₂-phobic segments (col. 6 lines 17-42). For example, the reference teaches the use of surfactants of the formula X(CF₂)_nCOOH, having a CO₂-philic fluoropolymer segment and a CO₂-phobic acid functionality. Because the blend of Humphrey's invention contains both polar and non-polar components, one would clearly envision the addition of a surfactant as aiding the compatibility of the blend components with solvents and blowing agents involved. Thus, it is the examiner's position that it

would have been prima facie obvious to add a surfactant by van Cleeff's teaching to the composition of Humphrey's invention in the expectancy of beneficial results.

23. Claims 39-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Humphrey, Jr. et al. in view of Pecsok as applied to claims 24-28, 30-38, and 46 above, and further in view of van Cleeff.

24. Humphrey and Pecsok apply as above, lacking express mention of the use of surfactants. The reference van Cleeff applies as above in paragraph 17. For the same reasons as stated above, it is the examiner's position that it would have been prima facie obvious to add a surfactant by van Cleeff's teaching to the composition of Humphrey's invention in an extrusion process with the expectancy of beneficial results. The surfactant would serve to compatibilize the blend components with the solvents and blowing agent composition.

25. Claims 3 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Humphrey, Jr. et al. in view of Boutillier et al.

26. Claims 3 and 49 limit the blowing agent to liquid carbon dioxide. Humphrey applies as above, teaching the use of supercritical carbon dioxide but not liquid carbon dioxide as a blowing agent. Boutillier teaches the conventionality of liquid carbon dioxide as a foaming agent (col. 8 lines 41-51) for vinyl monomers such as vinylidene fluoride (col. 7 lines 55-68). It is thought that liquid carbon dioxide would be more cost effective than supercritical carbon dioxide, since liquid carbon dioxide does not require

temperature control and pressurization to the extent that supercritical carbon dioxide requires. It is therefore the examiner's position that it would have been prima facie obvious to use liquid carbon dioxide as a blowing agent in Humphrey's invention to save energy required to keep carbon dioxide in a supercritical state.

27. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Humphrey, Jr. et al. in view of Pecsok as applied to claims 24-28, 30-38, and 46 above, and further in view of Boutillier et al.

28. Claim 29 limits the extrusion method to use liquid carbon dioxide as a blowing agent. Humphrey and Pecsok apply as above for the extrusion process, failing to mention the use of liquid carbon dioxide as a blowing agent. The reference van Cleeff applies as above in paragraph 21. For the same reasons as stated above, it is the examiner's position that it would have been prima facie obvious to use liquid carbon dioxide as a blowing agent in the composition of Humphrey's invention in an extrusion process with the expectancy of beneficial results. The use of liquid carbon dioxide would serve to save energy required to keep carbon dioxide in a supercritical state.

Allowable Subject Matter

29. Claims 21-22 and 44-45 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

30. The following is a statement of reasons for the indication of allowable subject matter:

31. The closest prior art, Humphrey, Jr. et al. (USPN 5,922,493) discloses a blend composition for foaming comprising two thermoplastics, one semi-crystalline and one amorphous, where the blend has a lower crystallinity than the first thermoplastic.

However, the reference does not teach the use of surfactants. Although it is the examiner's position that it would have been obvious to use a surfactant such as those taught in van Cleeff (USPN 6,169,139) to stabilize the composition, the secondary reference does not teach the use of copolymer surfactants such as those having CO₂-phobic polymer segments. The use of such surfactants in a blend composition of the applicant's claimed invention is deemed novel and unobvious over the prior art.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melanie D. Bagwell whose telephone number is (703) 308-6539. The examiner can normally be reached on M-F 8-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Seidleck can be reached on (703) 308-2462. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 872-9309.



James J. Seidleck
Supervisory Patent Examiner
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mdb
May 24, 2001